Current Trends on Spectrum Management

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General Background

- Radiocommunication services are services involving the transmission, emission and/or reception of radio waves for specific telecommunications purposes
- The radio spectrum used is divided into frequency bands
- Administrations allocate frequency bands to different categories of services
- Administrations often use a licensing process for different types of transmissions by service providers
- The service providers use the frequencies assigned to them by the administration
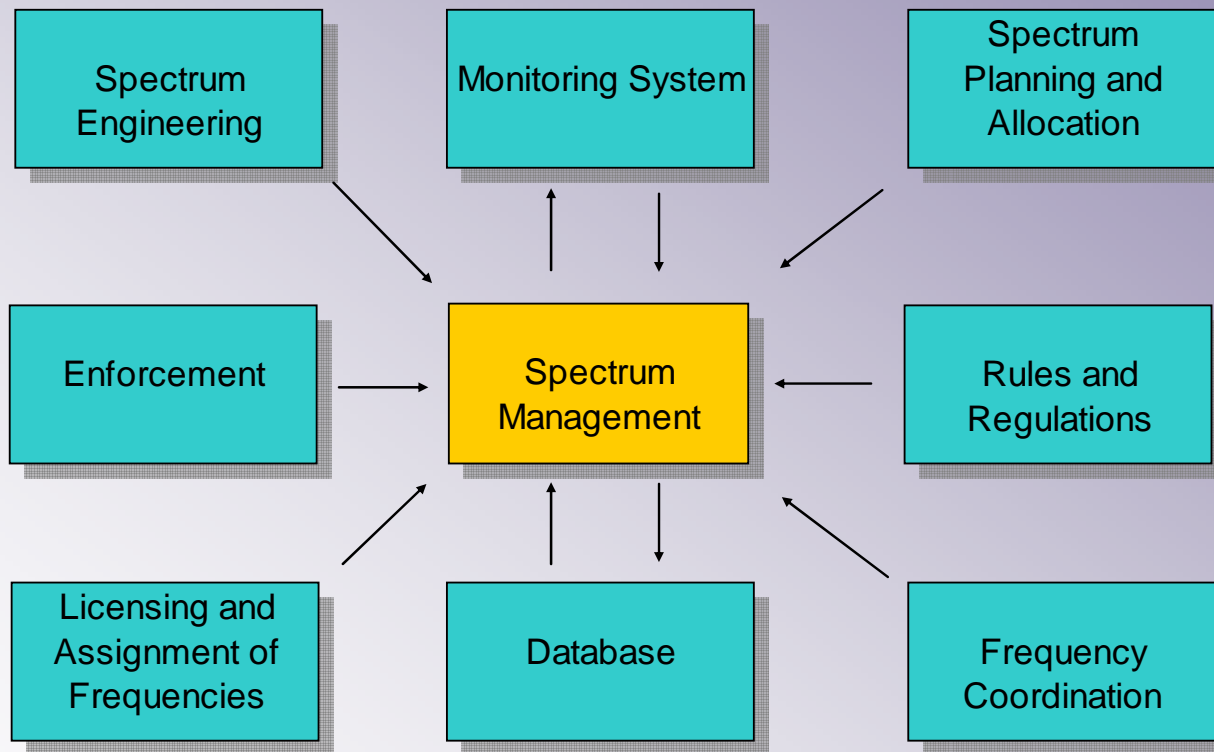
Defining Spectrum Management

Spectrum Management can be defined as all (national and international) activities associated with regulating the use of the radio spectrum, including:

- Defining the structure and processes for allocating, allotting, assigning and licensing the scarce resource called spectrum in the most economically efficient way possible (meeting market demands as much as possible) and in a way which allows other users and uses of the radio spectrum to also work/be used effectively (avoidance of interference – technical efficiency)

And

- Enforcing the associated rules and regulations

Spectrum Management

National Spectrum Management

- Countries and their respective regulators manage spectrum issues relating to:
  - Highest & Best Use, Public (government) and Private Use, Coexistence and Interference, and Health and Safety.

- Within their own borders, countries are free to manage their use of spectrum in any way they wish subject to not creating interference to their neighbors who are using spectrum in accord with the ITU Table of Frequency Allocations

National Spectrum Management

- Highest & Best Use
  - National Priorities
    - National defense, economic growth, social enhancement
  - Certain uses are better suited to particular portions of the spectrum (bands)
    - Too long (low frequency): impracticable antennas
    - Too short (high frequency): technological limitations of transmitting and receiving equipment
    - Equipment now available for extreme frequencies
    - Sharing technologies (*e.g.,* spread spectrum, packets Some uses can be as efficiently served by wireline
    - Unlimited capacity
    - Designating "bands" by use is efficient

National Spectrum Management

- ## Public and Private Use
  - Government need to support key services versus commercial need for access to additional spectrum
  - Use of commercial bands to support public services – Verizon supporting security applications in United States

- ## Coexistence and Interference
  - Uses interfere with one another
  - Frequency, time, location, power conflicts

- ## Health and Safety
  - Certain transmitting devices can cause dangerous levels of emissions
  - Such concerns and increasingly becoming part of spectrum management policies

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International Coordination

- Spectrum Management is not solely a national matter- it also involves co-ordination with the outside world, such as:
  - cross-border coordination with neighboring states and administrations;
  - regional co-ordination with regional organizations; and,
  - international co-ordination and cooperation with international organizations and events such as the International Telecommunications Union (ITU), the World Radiocommunications Conferences (WRC), the World Trade Organization (WTO), etc.

Instruments for International Coordination

- ITU Radio Regulations in particular are important instruments for spectrum managers across the globe since they are the primary reference point and are the result of the work of ITU World Radiocommunications Conferences and Regional Radiocommunications Conferences

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International Coordination Process

- The ITU coordination process is designed to facilitate the coordination between administrations and provides a mechanism to identify areas of potential interference between services and systems

- While effective in the long-term, the ITU process can be time-consuming and lengthy
  - This has led to Administrations undertaking bi-lateral and multi-lateral cross-border coordination agreements in an attempts to minimize cost and time spent on coordination

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Spectrum Management Paradigm Shift

- Techniques for improving the allocation process
  - Flexible allocations: Minimizing constraints on services that licensees may offer and technologies they employ
    - Within "new" spectrum allocations
    - Within existing spectrum allocations
  - Partitioning: Allowing licensees to voluntarily transfer a portion of their spectrum along geographic or other boundaries to other entities
  - Disaggregation: Allowing a licensee to voluntarily transfer discrete portions or "blocks" of their spectrum to other entities
  - Buyouts of existing licensees

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Spectrum Management Paradigm Shift

- Spectrum is viewed a finite resource – regulators' goal is to maximize its use

- Essential to establish
  - flexible service rules
  - transparent assignment processes,
  - consistent compliance and enforcement options

- Focus of assigning spectrum is on efficiency, equity, in-band migration, technical neutrality, and flexibility

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Spectrum Management Paradigm Shift

- Efficiency and Equity
  - Which uses/services are most important?
  - How many people would benefit from the service?
  - Will licensing this service/application stimulate competition?
  - What are the optimum bands from a technology perspective?
  - Are there incumbents in the bands?
  - Cost of relocating: Extent to which industry and public investment in frequency-specific equipment is upset

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Spectrum Management Paradigm Shift

- In-band migration – when regulators allow earlier-generation licensees to migrate to advanced services by using existing spectrum

  - a common tool to allow the operators to decide when the market and its consumers are ready for advanced wireless services

- Technical neutrality allows maximum use of the spectrum and overlay or deployment of advanced technologies, including advanced wireless services

Licensing in a Converging Environment

- Study existing spectrum uses
  - Assess if it can support the converged services
- Make allocation decision
- Initiate rulemaking to solicit public comment on frequency allocation
- Develop flexible service/technical rules that will govern licensees
- If necessary, relocate incumbents or implement sharing criteria

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Impact of Convergence on Spectrum Management

- New and emerging technologies and the increase in demand for spectrum-dependent wireless services will lead to spectrum management challenges for the regulator and user alike

- There is general agreement that the regulatory framework in many Administrations will have to change to accommodate the flexibility that modern technology allows in the provision of telecommunications goods and services

- The challenges lay in the identification of the changes that should be made, how they should be phased in, and how they should be implemented

Steps for Regulators

- Define a clear roadmap for access to spectrum needed to support current and next generation services on a technology neutral basis – Develop a plan, make it public

- Adapt and modify the telecommunications regulatory framework to accommodate the flexibility that modern technology allows

- Incorporate the capabilities that technological change permits into the management of the radio spectrum

- Enable the introduction of new and different services over existing infrastructure allowing in-band migration

- Enable deployment of broadband wireless access without identifying the technologies that must be employed

Thank You

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